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Priority environmental contamination in seafood:
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Carryover of CH_3Hg from feed to sea bass and salmon

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Model. Fish concentration (C_{fish}) as a function of feed uptake, elimination (k_E) and growth dilution (k_G), where uptake depends on feed concentration (C_{feed}), assimilation (α) and feeding rate (F). From fish and feed weight (w), specific growth rate (SRG) and feed conversion rate (FCR) are calculated.

$$\frac{dC_{fish}}{dt} = \alpha \cdot F \cdot C_{feed} - k_E \cdot C_{fish}$$

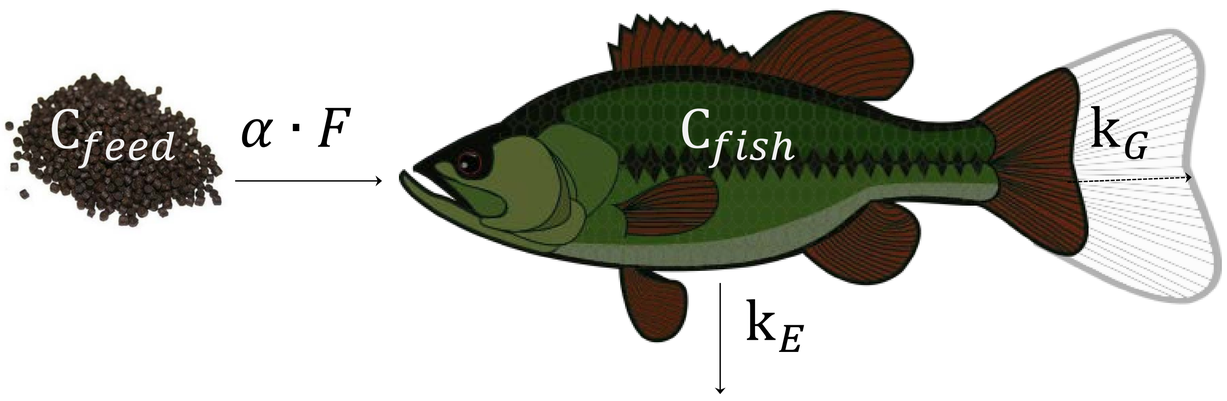
$$FCR = w_{feed\ consumed} \,/\, \Delta w_{fish\ gained} \quad [1]$$

$$k_G = SGR = (\ln w_t - \ln w_0)/\, t \quad [2]$$

$$C_{fish\ growt\ corrected}(t) = C_{fish} \cdot (1 + k_G \cdot t) \quad [3]$$

$$\ln (C_{fish} - C_{fish,\ control\ diet}) = constant - k_E \cdot t \quad [4]$$

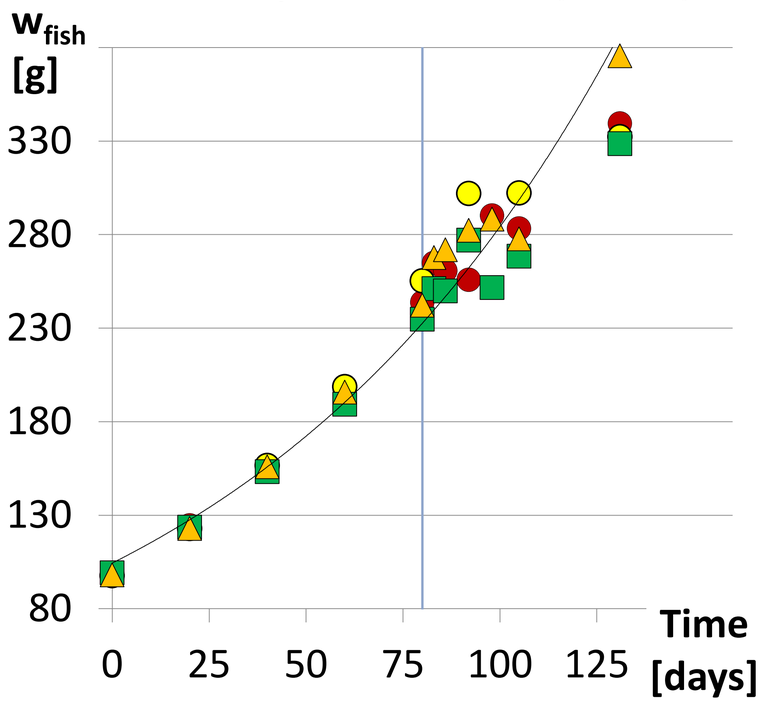
$$C_{fish}(t) = \frac{\alpha \cdot F \cdot C_{feed}}{k_E} \cdot (1 - \exp(k_E \cdot t)) \quad [5]$$



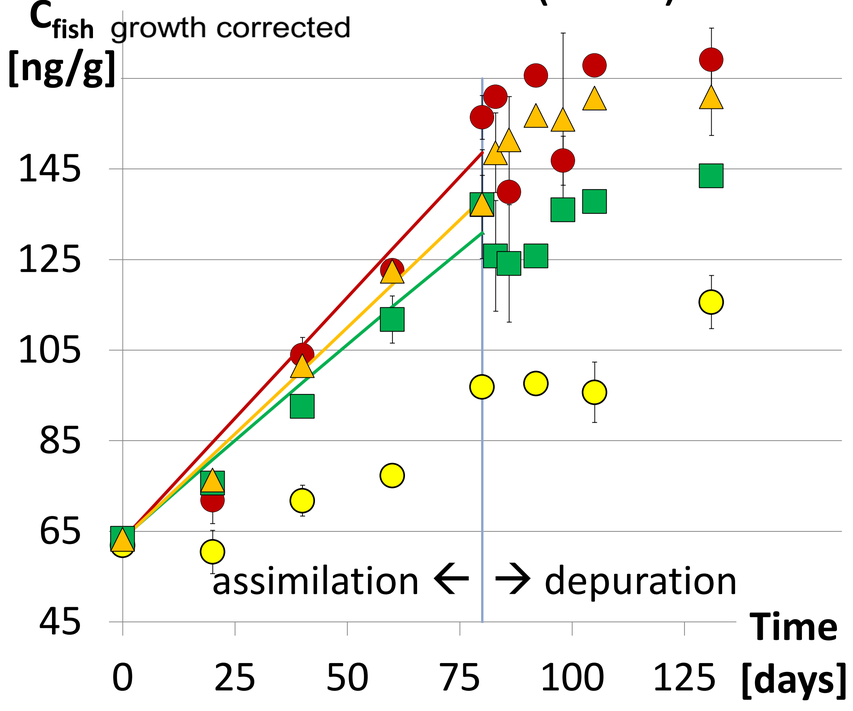
calculate FCR [eq 1] → calculate growth; SGR [eq 2] → calculate $F = \frac{FCR}{t} \frac{\Delta w_{fish\ gain}}{w_{fish\ mean}}$ → correct C_{fish} for growth [3] → estimate k_{el} [eq 4] → estimate α [eq 5]

Sea bass

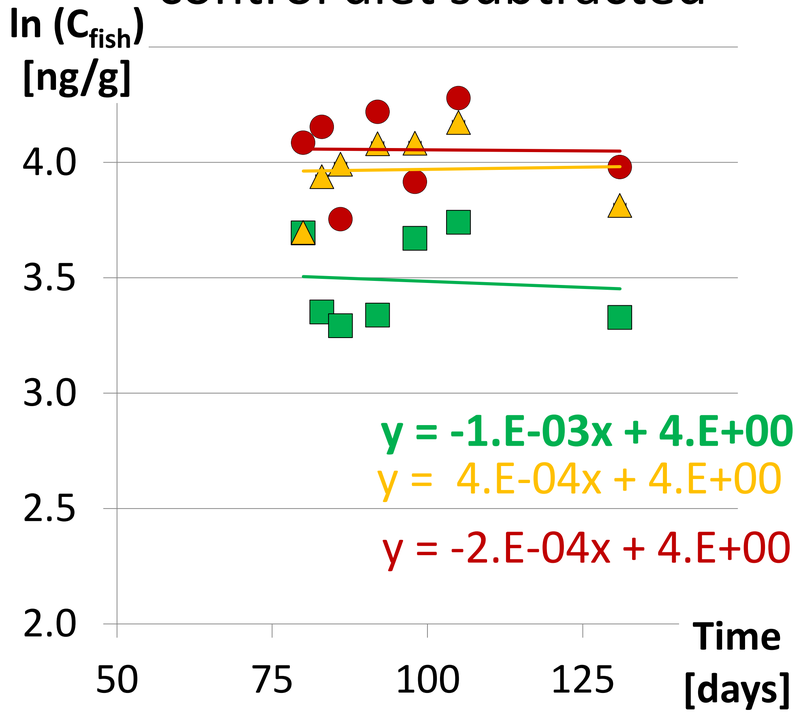
Growth
exp. mean fit (lines)



Fish conc. (Hg, mean, sd, n=2)
model fit (lines)



Elimination (k_E)
control diet subtracted



Conclusion. Toxicokinetics were modeled. Feed with low levels of CH_3Hg (41-75 ng/g) showed assimilation (α) close to 100% and low elimination (k_E). Similar results for all diets.

Results.	**Hg [ng/g]**	**Salmon**		**Sea bass**	
Diets	C_{feed}	k_E	α	k_E	α
■ 1) Spiked plastic	64	$-4 \cdot 10^{-3}$	0.69	$1 \cdot 10^{-3}$	1.04
▲ 2) Spiked oil + clean plastic	74	$1 \cdot 10^{-4}$	0.98	$-4 \cdot 10^{-4}$	0.96
● 3) Spiked oil	75	$-9 \cdot 10^{-4}$	0.84	$2 \cdot 10^{-4}$	1.08
○ 4) Control	41				

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